WE CLAIM:

1. A method of manufacturing a replication tool for a planar optical sheet, the method comprising:

mounting at least one optical element part on a base to form a master part;

forming a conductive metal layer over the master part;

electrochemically depositing over the conductive metal layer to form an electrochemically deposited layer; and

separating the electrochemically deposited layer from the master part.

2. A method as recited in claim 1, further comprising providing one or more mounting portions on the base, and mounting the at least one optical element to respective one or more mounting portions on the base, the respective one or more mounting portions providing position and orientation to the at least one optical element.

3. A method as recited in claim 2, wherein providing one or more mounting portions includes machining at least one of the one or more mounting portions on the base, the at least one of the one or more of the mounting portions having a mounting surface disposed at a selected angle relative to the base.

4. A method as recited in claim 1, further comprising machining the base to form an optical element part on the base directly.

5. A method as recited in claim 1, further comprising planarizing a backside of the electrochemically deposited layer.

6. A method as recited in claim 1, wherein forming the conductive layer includes depositing a metal layer over the master part.

7. A method as recited in claim 1, wherein electrochemically depositing over the conductive metal layer includes electrochemically depositing with one of nickel and copper.

8. A method as recited in claim 1, wherein the base is formed from one of copper and aluminum.

9. A method as recited in claim 1, further comprising masking portions of the base that are not to be electrochemically deposited on before electrochemically depositing over the conductive layer.

10. A method as recited in claim 1, wherein, during electrochemically depositing over the conductive layer, the conductive layer forms part of a cathode, and further comprising uniformizing current density of a current incident passing between an anode and the cathode.

11. A method as recited in claim 1, wherein separating the electrochemically deposited layer from the master part includes separating the electrochemically deposited layer from the conductive metal layer.

12. A method as recited in claim 1, wherein separating the electrochemically deposited layer from the master part includes separating the electrochemically deposited layer and the conductive metal layer from the master part.

13. A method as recited in claim 12, further comprising removing the conductive metal layer from the electrochemically deposited layer.

14. A method as recited in claim 13, wherein removing the conductive metal layer from the electrochemically deposited layer includes etching the conductive metal layer from the electrochemically deposited layer.

15. A method as recited in claim 1, further comprising machining a replicating surface of the electrochemically deposited layer after separating the electrochemically deposited layer from the master part to form an optical element replicating part on the replicating surface.

16. A former for making a replication tool for optical sheets, comprising:

a base;

at least one optical element part mounted on the base; and

a conductive coating covering the at least one optical element part and at least a portion of the base.

17. A former as recited in claim 16, wherein the base includes one or more mounting portions for the at least one optical element part.

18. A former as recited in claim 17, wherein the one or more mounting portions include a mounting surface for mounting a respective optical element part at a selected position on the base and at a selected orientation relative to the base.

19. A former as recited in claim 16, wherein the at least one optical element includes a micro-formed optical element part.

20. A former as recited in claim 19, wherein the micro-formed optical element part is disposed parallel to the base.

21. A former as recited in claim 19, wherein the micro-formed optical element part is disposed at an orientation nonparallel to the base.

22. A former as recited in claim 19, wherein the micro-formed optical element part is a diffractive optical element part.

23. A replication tool for replicating optical sheets, comprising:

a replicating surface, the replicating surface including at least a replication part for a micro-structured optical element and a replication part for a three-dimensional optical element.

24. A replication tool as recited in claim 23, wherein the replication part for the micro-structured optical element includes at least one micro-structure having a dimension perpendicular to the replication surface of less than 10 μm.

25. A replication tool as recited in claim 23, wherein the replication surface, other than the replication parts, is substantially planar.

26. A replication tool as recited in claim 25, wherein the replication part for the micro-structured optical element is substantially parallel to the replication surface, other than the replication parts.

27. A replication tool as recited in claim 25, wherein the replication part for the micro-structured optical element is disposed at a non-zero angle relative to the replication surface, other than the replication parts.

28. A replication tool as recited in claim 23, wherein the replication part for the micro-structured optical element includes a replication part for a diffracting optical element.

29. A replication tool as recited in claim 23, wherein the replication part for the three-dimensional optical element has a dimension perpendicular to the replication surface of at least 100 μm.

30. A replication tool as recited in claim 29, wherein the replication part for the three-dimensional optical element has a dimension perpendicular to the replication surface of at least 500 μm.

31. A replication tool as recited in claim 29, wherein the replication part for the three-dimensional optical element has a dimension perpendicular to the replication surface of at least 1 mm.

32. A replication tool as recited in claim 23, wherein the replication surface includes at least one integrated spacer replication part.

33. A replication tool as recited in claim 23, further comprising at least one optical element replication part machined directly on the replication surface.

34. An optical system, comprising:

a stack of at least two optical sheets, at least one of the optical sheets including a surface replicated with a micro-structured optical element and at least one three-dimensional optical element.

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35. A system as recited in claim 34, wherein the replicated micro-structured optical element has a feature height of less than 10 μm.

36. A system as recited in claim 34, wherein the replicated micro-structured optical element is a transmissive diffractive optical element.

37. A system as recited in claim 34, wherein the replicated micro-structured optical element is a reflective, diffractive optical element.

38. A system as recited in claim 34, wherein the three-dimensional optical element has a vertical dimension of at least 100 μm relative to a replication base surface.

39. A system as recited in claim 34, wherein the three-dimensional optical element has a vertical dimension of at least 500 μm relative to a base surface.

40. A system as recited in claim 34, wherein the three-dimensional optical element has a vertical dimension of at least 1 mm relative to a base surface.

41. A system as recited in claim 34, wherein at least one of the optical sheets includes a first surface replicated with at least a first optical element and a second surface replicated with at least a second optical element.

42. A system as recited in claim 34, further comprising one or more spacers interposed within the stack of at least two optical sheets.

43. A system as recited in claim 34, wherein at least one of the optical sheets includes an integrated spacer.

44. A system as recited in claim 34, wherein an optical path within the stack passes from a first optical element on a first optical sheet to a first optical element on a second optical sheet and to a second optical element on the first optical sheet.

45. A system as recited in claim 44, wherein the first and second elements on the first optical sheet are on a first surface of the first optical sheet.

46. A system as recited in claim 34, further comprising at least one active optical element disposed on one of the optical sheets.

47. A system as recited in claim 34, further comprising at least one passive optical element attached to a surface of one of the optical sheets.

48. An optical system, comprising:

a plurality of stacked optical sheets, each of the stacked optical sheets including at least one optical element replicated on a surface to define the optical circuit;

wherein an optical path within the plurality of stacked sheets passes from a first optical element on a first optical sheet of the plurality of stacked optical sheets to a first optical element on a second optical sheet of the plurality of stacked optical sheets and to a second optical element on the first optical sheet.

49. A system as recited in claim 48, wherein the optical path further passes from the second optical element on the first optical sheet to a second optical element on the second optical sheet.

50. A system as recited in claim 48, wherein the first and second optical elements on the first optical sheet are on a first surface of the first optical sheet.

51. An system as recited in claim 48, wherein the first and second optical elements on the first optical sheet are respectively on first and second surfaces of the first optical sheet.

52. An system as recited in claim 48, wherein one of the optical sheets includes a surface replicated with a micro-structured optical element.

53. An system as recited in claim 52, wherein the micro-structured optical element is a reflective diffractive optical element.

54. An system as recited in claim 52, wherein the micro-structured optical element is a transmissive diffractive optical element.

55. A system as recited in claim 48, further comprising one or more spacers interposed within the plurality of stacked optical sheets.

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56. A system as recited in claim 48, wherein one of the optical sheets defines a sheet plane and has a surface replicated with an optical element having a dimension of at least 100 μm in a direction perpendicular to the sheet plane.

57. A system as recited in claim 48, wherein one of the optical sheets defines a sheet plane and has a surface replicated with an optical element having a dimension of at least 500 μm in a direction perpendicular to the sheet plane.

58. A system as recited in claim 48, wherein one of the optical sheets defines a sheet plane and has a surface replicated with an optical element having a dimension of at least 1 mm in a direction perpendicular to the sheet plane.

59. A system as recited in claim 48, wherein at least one of the optical sheets includes an integrated spacer.

60. A method of making an optical system, comprising:

making one or more replication tools having respective replication surfaces, wherein making a replication tool having a replication surface includes

mounting at least one optical element part on a base to form a master part;

forming a conductive metal layer over the master part;

electrochemically depositing over the conductive metal layer to form an electrochemically deposited layer;

separating the electrochemically deposited layer from the master part and exposing the replication surface;

replicating optical elements on optical sheets using the one or more replication tools;

stacking replicated optical sheets to form a stack; and

separating optical system cells from the stack.

61. A method as recited in claim 60, further comprising bonding adjacent optical sheets in the stack.

62. A method as recited in claim 61, wherein bonding adjacent optical sheets includes providing adhesive along cut lines on at least one of the adjacent sheets.

63. A method as recited in claim 60, replicating the optical elements on the optical sheets includes replicating a first set of optical elements in a first cell on an optical sheet and replicating a second set of optical elements in a second cell on the same optical sheet.

64. A method as recited in claim 63, wherein stacking replicated optical sheets includes stacking a first sheet replicated with first sets and

second sets of optical elements with a second sheet replicated like the first sheet.

65. A method as recited in claim 64, further comprising stacking a first set of optical elements on the first sheet with a respective second set of optical elements on the second sheet.

66. A method as recited in claim 60, further comprising providing alignment structures on the optical sheets for aligning adjacent optical sheets in the stack.

67. A method as recited in claim 66, wherein providing the alignment structures includes providing a first set of alignment structures on a first surface of a first optical sheet, providing a second set of alignment structures, complementary to the first set of alignment structures, on a second surface of a second optical sheet and further comprising mating the first surface of the first optical sheet with the second surface of the second optical sheet.

68. A method as recited in claim 67, wherein providing the first and second sets of alignment structures includes replicating the first and second sets of alignment structures on the first and second surfaces respectively.

69. A method as recited in claim 67, wherein providing the first and second sets of alignment structures includes replicating the first set of alignment structures on the first surface and machining the second set of alignment structures on the second surface after replicating the second optical sheet.

70. A method as recited in claim 66, wherein providing the alignment structures includes providing matching sets of one or more through holes in at

least first and second optical sheets and inserting guide pins into respective through holes in the at least first and second optical sheets.

71. A method as recited in claim 66, wherein providing the alignment structures includes providing the alignment structures on first and second optical sheets, and further comprising holding at least two optical sheets clamping surfaces provided with complementary structures that mate with the alignment structures on the first and second optical sheets.

72. A method as recited in claim 60, further comprising inserting one or more spacers between the replicated optical sheets forming the stack.

73. A method as recited in claim 60, wherein replicating the optical elements on the optical sheets includes replicating integrated spacers on at least one of the optical sheets.

74. A method as recited in claim 60, further comprising mounting passive optical elements on at least one of the optical sheets before separating the optical system cells from the stack.

75. A method as recited in claim 60, further comprising mounting active optical elements on at least one of the optical sheets before separating the optical system cells from the stack.

76. A method as recited in claim 60, further comprising optically coating at least a portion of at least one of the optical sheets before separating the optical system cells from the stack.

77. A method as recited in claim 60, wherein replicating the optical elements on the optical sheets includes replicating on a surface of a first optical

sheet at least a diffractive optical element and another optical element having a dimension of at least 100 μm in a direction perpendicular to the first optical sheet.